

Memorandum

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To: LENA ASHLEY
DESIGN SENIOR
OFFICE of DESIGN NORTH
DESIGN BRANCH E-3

Date: May 24, 2018

File: 01-MEN-01-
PM 43.3/44.2
Albion River Bridge
(Replacement)
EA 01-401100
ID 0100000154

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Revised Plan to Perform Geotechnical Investigation (PPGI)

BACKGROUND

Per your request, the Office of Geotechnical Design North (OGDN) has prepared this foundation design investigation Site Plan for the replacement of the existing Albion River Bridge on Route 01, PM 43.3-44.2 in Mendocino County. At the time of this writing the geotechnical investigation will be limited to alternative Alt. “A” (single arch). Drill site 4 has been eliminated but may be pursued later. The purpose of this memorandum is to describe the unique aspects of each possible drill site or group of drill sites for in-house drilling planning purpose. These aspects include:

1. Location of the 6 drill sites.
2. Drilling specifications.
3. Drill site terrain, undergrowth and tree conditions.
4. Proposed earthwork using heavy equipment and/ or handwork that will be required to construct site ingress/regress routes, drill pad/staging areas.
5. Drill and support vehicles including cranes and possible use of helicopter.
6. Site environmental protection and restoration measures during and after completion of work.

DRILL SITES

Drill Site 1 - Abutment 1 (Alt “A”)

Access will be from Highway 1 at approximately Station 123+50. Temporary removal of the guard railing will be required. The site terrain ranges from flat to moderately steep. Extensive cut grading will be necessary to construct an access route and a sufficient level pad area (30 feet by 40 feet). An approximate 10 to 12 feet vertical cut into the hillside will be required. The cut will be laid back sufficiently to be stable. Vegetation is sparse to moderately dense and consists mainly of underbrush, small trees and grass. Vegetation removal and trimming will be required. A rubber tired truck mounted drill rig will be used at this site. The estimated depth of the boring depth is approximately 70 to 90 feet.

Temporary Fiber Rolls will be placed on all exposed slopes. Temporary silt fencing will be placed on the downslope side of the drill pad and access road. Upon completion of work, the area will be regraded to the original contours, reseeded with native plants and straw will be placed on exposed soil areas.

Drill Site 2 - Pier 2 (Alt “A”)

Access will be from Highway 1 (Station 123+50). The site is located on a relatively steep patchy sparse to densely vegetated hillside below Site 1. Grading to provide direct vehicle access to the site is not considered feasible. Utilizing Site 1 as a staging area, a self-leveling track mounted drill or a crane delivered steel platform and drill rig to the drill site will be employed. Alternatively, a helicopter may be employed to deliver the equipment and supplies. Support vehicles will be located on Site 1. Brush trimming will be required. There will be minor ground disturbance anchoring the four corners of the steel platform to the ground. The footpads of the four legs supporting the steel platform will be anchored by driving steel rods into the ground. The estimated depth of the boring is 100 feet.

Temporary Fiber Rolls will be placed downslope of the drilling locations and grading locations, if any. Upon completion of work, straw will be placed on any areas of vegetation removal and those areas will be reseeded with native plants.

Drill Site 5 Inclined Boring -Pier 4 (Alt “A”)

Drill Site 5 is located at Station 132+40 near the base of a steep slope that descends from the edge of Highway 1. Helicopter access will be employed to deliver the equipment and supplies. Support vehicles can be located near the north end of the campground and the south end of the staging area north of the Albion River bridge. The estimated depth of the boring is 125 feet.

Brush trimming will be required. There will be minor ground disturbance anchoring the four corners of the steel platform to the ground. The footpads of the four legs supporting the steel platform will be anchored by driving steel rods into the ground.

Drill Site 6 – Pier 5 (Alt “A”) and Drill Site 7- Pier 6 (Alt “A”)

These drill sites are located generally on the steep slope above Drill Site 5. The sites will be accessed from Highway 1 at station 134+00 and/or Station 136+85. The Drill Sites most likely will be serviced by crane from the top of the slope at about Station 134+00 (D.S. 6) and Station 134+20 (D.S.7). Drilling will be performed from steel platforms placed by crane. The top of the slope area which includes drill site 8 will be graded to create level ground to accommodate vehicle access and staging. At the top of the slopes and on the slopes above the drill sites much of the existing vegetation, including many eucalyptus trees, would have to be trimmed and/or removed. Alternatively, a self-leveling track mounted drill would be utilized. Trimming of brush and cutting some trees along the path to and at the drill site would be required. There is the possibility that a helicopter would be needed to deliver a drill rig and materials to Drill Site 6. The estimated boring depth is 125 ft.

Temporary Fiber Rolls will be placed downslope of the drilling locations and grading locations, if any. Upon completion of work, straw will be placed on any areas of vegetation removal and those areas will be reseeded with native plants.

Drill Site 8 – Abutment 7 (Alt “A”)

The abutment site is located just west of the existing Highway 1. Access to the site will also be off Highway 1 at approximately Station 134+00 and/or Station 136+85 as noted above the site, as discussed above, will be graded to accommodate access for vehicles and staging and much of the existing vegetation, including many eucalyptus trees, would have to be removed. A standard truck mounted drill rig will be utilized for borings that are

located within the graded pad area. A steel platform and drill rig would be placed using a crane for the boring located slightly down slope of the graded pad area. The depth of the boring(s) will be approximately 70 to 90 feet.

Temporary silt fencing will be placed downslope of the drilling locations and graded area. Upon completion of work, the graded area will be restored, including a vegetated slope with Temporary Check Dams immediately adjacent to the roadway. Straw will be placed on any areas of vegetation removal and those areas will be reseeded with native plants.

IMPACT ON STABILITY OF COASTAL BLUFF

The bluff area involved includes the south facing bluff located between approximately Stations 132+50 and 133+50 and the generally west facing bluff located between approximately Stations 134 and 136 (Drill Sites 7 and 8). These bluff areas are steep (Hz: Vt. 1:1 and steeper) and approximately 148 feet in height. Based on our past geologic reconnaissance we feel that the bluff areas are most likely globally stable. However, one of the purposes of our proposed geotechnical investigation will be to confirm our initial assessment and/or provide remedial recommendations if required. In the case of the west facing bluff area there is obvious shallow (approximately +/- 5 feet) earth movement in the form of mass wasting (particle by particle erosion), slumping and debris flows. The ground movement appears to extend to below the depth of the root system of the Eucalyptus trees that are perched on the bluff slope face. Some of these trees have been completely undermined and have subsequently slid on to the beach below.

The planned grading, lowering the bluff height approximately 4-6 feet (2.8% height reduction) to facilitate access to the investigation area, in our opinion will have no negative impact on the stability of the coastal bluff areas in question. In fact, the grading, that includes flattening the ground surface with an approximate 1% west to east tilt to direct potential surface runoff away from the bluff will be a benefit. In addition, Caltrans construction site BMP will be implemented to control and contain surface drainage and erosion.

DRILLING EQUIPMENT

The drill equipment will include track mounted All-Terrain drill rigs, truck mounted drill rigs and a smaller skid mounted rig. Support vehicles include an equipment/water tender,

drill crew cab and geologist/engineer vehicles. The drilling and sampling will be done using a rotary wash wire-line system with drill pipe diameters of 57, 94 and 114-mm. The boring depths have been previously noted. Drilling fluids consisting of water mixed with bentonite and/or polymer that will be re-circulated through a closed system that includes drill pipe, pump, hoses and a mud tank. After completion of the drilling the drill cuttings and fluids will be pumped into 55-gallon drums and transported to the Transportation Laboratory in Sacramento for processing. After the drilling fluids removal, a combined slope inclinometer/piezometer will be installed in selected boring to monitor ground movement and changes in groundwater elevations.

ENVIRONMENTAL PRECAUTIONS

Precautions during drilling will be employed to mitigate any possible equipment leaks or drilling fluid spillage. They may include plastic tarps, absorption mats and jute waddles. Contained drill fluids generated during drilling will be pumped in to 55-gallon steel drums and transported to Caltrans facilities for processing.

SITE RESTORATION

Ground conditions altered due to work activities will be restored utilizing Best Management Practices (BMP). The BMP restoration will include re-seeding, placement of straw and jute waddles. Where more extensive earthwork occurred (Drill Sites 1, 6, 7 and 8) the ground will be re-graded to conform to State drainage and erosion protection standards. The borings will be backfilled following the GS-01 Directive.

Lena Ashley
April 18, 2018
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SEISMIC REFRACTION SURVEY

A seismic refraction survey will be employed to supplement the drilling data and geologic mapping of the bridge site. To facilitate the placement of the geophone arrays some brush removal may be required. Locations of the proposed seismic refraction lines are shown on Plate 1.

If more information and/or clarifications are needed, please contact William Bertucci at 916.203.7992 or John Huang at 916.227.1037

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Appendix – Seismic Refraction Surveys and Environmental Impacts

Attachment: Geotechnical Exploration Plan

cc:	FDemling	District Project Manager
	JAlamares	Structure Maintenance
	RClose	Right of Way
	LAshley	District Design Branch Chief
	TPhillips	District Design-Project Engineer
	JHarcharik	Surveys
	LWalker	Environmental
	KSchinke	Cultural

APPENDIX

Seismic Refraction Surveys and Environmental Impacts

This document summarizes typical scope and environmental impacts posed by seismic refraction surveys conducted for the Department of Transportation.

General Description of Work

Geophones (small 2 inch square sensors on a 3 inch long, by 2 inch diameter spike) are inserted into the ground at specific intervals (3 to 10 feet typical) and connected to a cable that is in turn attached to a battery-powered seismograph.

Geophones record vibratory impulses generated by active sources. The number of source locations used on a typical seismic line varies from 5 to 20, depending on required resolution.

Survey locations are selected based on the goals of the investigation, safety requirements and access restrictions imposed by environmental and entry permits. Access to survey locations may be by motor vehicle or by foot, again depending on access restrictions.

Environmental Impacts

Site Access

Site access is by motor vehicle or by foot, depending on access restrictions. When used, motor vehicle access is limited to existing roads and trails. Motorized or non-motorized boats may be used for water access, depending on depth of water and access restrictions.

Hours of Work

All work is conducted during daylight hours from Monday through Friday. Exceptions occur during stated emergencies only.

Equipment Storage

Unless placed in a designated and secure construction area, no equipment is stored on-site. All equipment is portable and secured in vehicles when not in use.

Footprint and Area of Related Ground Disturbance

Twenty four (24) or more geophones (small 2" square sensors on a 3"spike) are planted at the ground surface. The geophones are removed after work is completed. The spike is approximately 12-inch in diameter, and leaves no lasting impression in the ground surface. Ground and vegetation disturbance is isolated to foot-traffic areas and locations where the sources are employed. (Additional discussion of source effects is provided below). The extent of source disturbance at the ground surface increases with source strength. Typical maximum disturbance consists of a circular area of raised earth approximately 5 feet in diameter centered over the source's original location. An effort is made to conceal disturbed brush and tamp down disturbed soil to return it to its original condition. Minor brush cutting is occasionally required for access and is minimized wherever possible. Effort is made to restore visual impacts at the conclusion of the survey.

Source Effects

The hammer and striker plate source consists of a 12- to 16-lb sledgehammer struck against a small metal plate placed on the ground. This creates the least ground disturbance (a dent or divot in ground in the shape of the plate). Contrary to expectation, however, this source typically creates the greatest noise. The "ping" from the hammer striking the plate may exceed 106 dB in the vicinity of the operator, so hearing protection is required when operating this source.